

the prism to move the enlarged picture along one of two perpendicular coordinates. In this way it is possible to move the picture-magnification (by means of microscope and distance) of 15000 times enlargement over the small opening of a photocell. The readings are made directly by observing in a microscope the deviations of a filament-electrometer connected with the photocell. Very small areas – especially dependent on the opening and other properties of the photocell and on the magnification – in different structures in one cell can be defined and quantitatively determined by measurements in different focus.

Hammarsten went on to note that in some instances Caspersson employed two photocells, radio equipment, two galvanometers, and a double thermocell.

Caspersson's early application of these instruments contributed significantly to the understanding of the role of nucleic acids in the cell. He determined that under ultraviolet illumination, nucleic acids and proteins had different absorption spectra so that he could measure local quantities of both (Caspersson, 1936). One of his first findings was that it is in cell division that the amount of nucleic acid reaches its maximum. It is important to note that Caspersson did not conclude that the DNA represents genetic material. He rather indicated that the result "points with some probability towards a connection between the duplication of the genes and the presence of nucleic acid" (Caspersson, 1950, p. 96). For him, the genes were proteins. In his collaboration with Jack Schultz, he linked disturbances in nucleic acid metabolism with disturbances in reproduction (Caspersson & Schultz, 1940), but he continued to see the nucleic acids as serving only an ancillary role in the mechanism of self-replication of protein. He commented, "nucleic acids are necessary prerequisites for the reproduction of genes and . . . are probably necessary for the multiplication of self-reproducing protein molecules in general" (Caspersson, 1950, p. 98; summarizing Caspersson & Schultz, 1938).

Caspersson's main approach was to establish correlations involving the nucleic acids and protein synthesis. Some of this work focused on what he took to be the self-replication of proteins in chromosomes during metaphase, which he linked with DNA in the euchromatic region of the chromosome. He traced cytoplasmic proteins to the heterochromatic regions of the chromosome and its apparent relation to the nucleolus during the interphase stage. He interpreted the nucleolus as regulating protein synthesis that occurs in the nucleus just outside the nucleolus. In his report in September 1940, he summarized his conclusions:

Polynucleotides are a base for the protein synthesis in the cell. A central function for the cell nucleus is to be the centre for the protein production. The